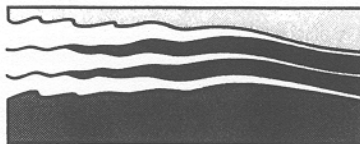


CENTER FOR COASTAL PHYSICAL OCEANOGRAPHY

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February 11, 1999

Dr. Paul Fiedler
Southwest Fisheries Science Center
P.O. Box 271
La Jolla, CA 92038

Dear Paul:

I have reviewed the draft document that you and others have prepared on "ETP Dolphin Habitat Variability". I believe that the analysis presented in this document is the best possible given the available data sets and current state of knowledge about this system. The conclusions given in the draft document are supported by the data analysis and statistical modeling results. A conclusion that can be drawn from this analysis is that long time series data sets for dolphins and environmental parameters are needed.

Enclosed are some comments that may be useful in revising this document to make some aspects clearer. Please feel free to use these comments as you think best.

Sincerely,

Eileen E. Hofmann
Professor

enclosure (1)

Comments on: ETP Dolphin Habitat Variability
1 February 1999 Draft Document
Submitted by Eileen E. Hofmann, 11 February 1999

1. It would be useful to indicate on Figure 1 the periods corresponding to the cruises and historical data sets that are being used in the analysis. This would clearly show the relationship between data sets and environmental events such as ENSO.
2. It would be useful to include in the text a brief description of what constitutes an El Niño/La Nina in the time series shown in Figure 1. Something as simple as,El Niño (SOI negative).... would be sufficient.
3. Following from the above comment, how are weak, moderate and strong ENSO events determined from the SOI? Providing SOI numbers following statements related to strength of the events, such as ... a strong ENSO event (SOI values more than -2)...., would be sufficient.
4. In the discussion of Figure 3, might be worth mentioning that the large-scale structure of the chlorophyll fields is similar from year-to-year and that the effect of ENSO is to change the amplitude of the chlorophyll concentration. For example, there appears to always be regions of higher chlorophyll off Central America and South America (at about 5°S), independent of environmental state. This is evidence for concluding that the structure of the environment has not undergone a fundamental change, but rather only varies in amplitude with values that are within historical ranges. This provides an argument for the dolphins being able to adjust to short-scale changes in their environment, which they have clearly had to do over evolutionary time.
5. The argument given in comment (4) can also be applied to the habitat suitability plots. The large-scale structure of these fields does not change between years. Rather the amplitude and spatial extent of the "best" habitat differs during periods of El Niño and La Nina. Again, over evolutionary time a species that can move will develop strategies to accommodate high-frequency changes in its habitat, especially those that occur at regular intervals. This supports the argument that environmental variability cannot explain observed change or lack of change in the NE offshore spotted dolphin and the spinner dolphin stocks.
6. You may wish to check the recent article in *Science* (Rodbell *et al.*, Vol. 283, 516-520, 1999) that suggests that the frequency of El Niño events per decade has increased over the past 15,000 years. This may be relevant to your work, especially if you are making the argument that El Niño events are not affecting

the dolphin habitat. For example, would 2 to 3 El Niño events per decade rather than 1 to 2 per decade cause a problems for dolphin reproduction or survival of young dolphin? This is a subtle point and perhaps not relevant to the current issue. However, much is being written now about changing environmental frequencies and what these are doing to animal and plant populations and someone may invoke this as an explanation for decreases in dolphin stocks in the ETP. A possible response to this is that such changes in the environment evoke gradual rather than drastic changes in populations.
